

1    1.    A method for determining a biological window of a magnetic field comprising the steps  
2    of:

3                preparing a reaction solution containing at least the following components: MLC,  
4    MLCK, calmodulin, calcium ions, and radiolabeled ATP, and exposing the reaction solution to a  
5    magnetic field;

6                removing the reaction mixture from the magnetic field and forming a specimen by  
7    placing a quantity of the solution onto a substrate;

8                washing the specimen;

9                placing the washed specimen in a suspension liquid and counting the number of  
10   radioactive events over a given time T.

11

12   2.    The method of Claim 1, wherein exposing the specimen includes the following step:

13                exposing the specimen for a period of time within the linear portion of the time  
14   dependence curve of myosin phosphorylation rate.

15

16   3.    The method of Claim 2, further including the step of:

17                exposing the specimen to the magnetic field for a period within the range of time between  
18   2 and 6 minutes.

19

20   4.    The method of Claim 3, further including the step of:

21                exposing the specimen to the magnetic field for a period of 5 minutes.

22

23   5.    The method of Claim 1, wherein the step of removing the reaction mixture includes the  
24   following step:

25                stopping the reaction by adding a stopping solution to the specimen.

26

27   6.    The method of Claim 1, wherein the step of removing the reaction mixture includes the  
28   following step:

29                stopping the reaction by eliminating the effect of the magnetic field on the specimen.

30

1      7.     The method of Claim 1, wherein the step of placing a quantity of the solution onto a  
2     substrate includes the following step:

3         placing a quantity of solution on filter paper.

4

5      8.     The method of Claim 1, wherein the step of washing the specimen includes the following  
6     step:

7         placing the specimen in a container containing an acidic solvent.

8

9      9.     The method of Claim 8, wherein the step of placing the specimen in a container  
10    containing an acidic solvent includes the following step:

11         placing the specimen in a container containing a solution of TCA.

12

13     10.    The method of Claim 8, wherein the step of placing the specimen in a container  
14    containing an acidic solvent includes the following step:

15         placing the specimen in a container containing an acidic solvent and agitating the solvent.

16

17     11.    The method of Claim 1, wherein the step of placing the washed specimen in a  
18    suspension liquid includes the following step:

19         placing the washed specimen in a suspension of water.

20

21     12.    The method of Claim 11, wherein the step of placing the washed specimen in a  
22    suspension of water:

23         placing the washed specimen in a container of water suitable for use in a liquid  
24    scintillation counter.

25

26     13.    The method of Claim 1, wherein the step of counting the number of radioactive events  
27    over a given time T includes the following step:

28         counting the radioactive events by counting the Cherenkov emissions.

29

1    14. The method of Claim 1, wherein exposing the reaction solution to a magnetic field  
2 includes the following step:

3                 creating a magnetic field prior to exposure such that the magnetic field has a frequency of  
4    80 to 180 pulses per second.

5

6    15. The method of Claim 14, wherein the step of creating a magnetic field prior to exposure  
7 such that the magnetic field has a frequency of 80 to 180 pulses per second further includes the  
8 following step:

9                 creating a magnetic field having a frequency of between 80 and 140 pulses per second.

10

11    16. The method of Claim 15, wherein the step of creating a magnetic field prior to exposure  
12 such that the magnetic field has a frequency of 80 to 140 pulses per second further includes the  
13 following step:

14                 creating a magnetic field having a frequency of between 80 and 120 pulses per second.

15

16    17. The method of Claim 16, wherein the step of creating a magnetic field prior to exposure  
17 such that the magnetic field has a frequency of 80 to 120 pulses per second further includes the  
18 following step:

19                 creating a magnetic field having a frequency of between 100 and 120 pulses per second.

20

21    18. The method of Claim 17, wherein the step of creating a magnetic field prior to exposure  
22 such that the magnetic field has a frequency of 100 to 120 pulses per second further includes the  
23 following step:

24                 creating a magnetic field having a frequency of 100 pulses per second.

25

26    19. The method of Claim 17, wherein the step of creating a magnetic field prior to exposure  
27 such that the magnetic field has a frequency of 100 to 120 pulses per second further includes the  
28 following step:

29                 creating a magnetic field having a frequency of 120 pulses per second.

30

1    20. The method of Claim 1, wherein exposing the reaction solution to a magnetic field  
2 includes the following step:

3                 creating a magnetic field prior to exposure such that the magnetic field has a frequency of  
4 100 to 120 pulses per second.

5

6    21. The method of Claim 20, wherein the step of creating a magnetic field prior to exposure  
7 such that the magnetic field has a frequency of 100 to 120 pulses per second further includes the  
8 following step:

9                 creating a magnetic field having a frequency of 100 pulses per second.

10

11    22. The method of Claim 20, wherein the step of creating a magnetic field prior to exposure  
12 such that the magnetic field has a frequency of 100 to 120 pulses per second further includes the  
13 following step:

14                 creating a magnetic field having a frequency of 120 pulses per second.

15

16    23. The method of Claim 1, wherein exposing the reaction solution to a magnetic field  
17 includes the following step:

18                 creating a magnetic field prior to exposure such that the magnetic field has an amplitude  
19 between 5 and 55 milliTesla.

20

21    24. The method of Claim 23, wherein the step of creating a magnetic field prior to exposure  
22 such that the magnetic field has an amplitude between 5 and 55 milliTesla further includes the  
23 following step of:

24                 creating a magnetic field prior to exposure such that the magnetic field has an amplitude  
25 between 10 and 25 milliTesla.

26

27    25. The method of Claim 23, wherein the step of creating a magnetic field prior to exposure  
28 such that the magnetic field has an amplitude between 5 and 55 milliTesla further includes the  
29 following step of:

30                 creating a magnetic field prior to exposure such that the magnetic field has an amplitude  
31 between 40 and 55 milliTesla.

1    26. The method of Claim 24, wherein the step of creating a magnetic field prior to exposure  
2    such that the magnetic field has an amplitude between 10 and 25 milliTesla further includes the  
3    following step of:

4                 creating a magnetic field prior to exposure such that the magnetic field has an amplitude  
5    between 15 and 20 milliTesla.

6

7    27. The method of Claim 25, wherein the step of creating a magnetic field prior to exposure  
8    such that the magnetic field has an amplitude between 40 and 55 milliTesla further includes the  
9    following step of:

10                creating a magnetic field prior to exposure such that the magnetic field has an amplitude  
11    between 45 and 50 milliTesla.

12

13    28. The method of Claim 26, wherein the step of creating a magnetic field prior to exposure  
14    such that the magnetic field has an amplitude between 15 and 20 milliTesla further includes the  
15    following step of:

16                creating a magnetic field prior to exposure such that the magnetic field has an amplitude  
17    of 15 milliTesla.

18

19    29. The method of Claim 27, wherein the step of creating a magnetic field prior to exposure  
20    such that the magnetic field has an amplitude between 45 and 50 milliTesla further includes the  
21    following step of:

22                creating a magnetic field prior to exposure such that the magnetic field has an amplitude  
23    of 45 milliTesla.

24

25    30. The method of Claim 1, wherein the step of creating a magnetic field prior to exposure  
26    such further includes the following step of:

27                creating a magnetic field prior to exposure such that the magnetic field has an amplitude  
28    of 15-50 milliTesla.

29

30

1    31. A method for determining a relative biological effectiveness of a magnetic field using  
2    cell free myosin phosphorylation comprising the steps of:

3                 preparing a reaction solution containing at least the following components: MLC,  
4    MLCK, calmodulin, calcium ions, and radiolabeled ATP, and

5                 exposing a first volume of the reaction solution to a first magnetic field, and

6                 exposing a second volume of the reaction solution to a second magnetic field;

7                 removing the reaction mixture from the first magnetic field and forming a first specimen  
8    by placing a quantity of the first volume of solution onto a substrate;

9                 removing the reaction mixture from the second magnetic field and forming a second  
10   specimen by placing a quantity of the second volume of solution onto a substrate;

11                 washing the first specimen;

12                 washing the second specimen;

13                 placing the washed first specimen in a suspension and counting the number of radioactive  
14   events over a given time T; and

15                 placing the washed second specimen in a suspension and counting the number of  
16   radioactive events over a given time T.

17

18   32. The method of Claim 31, wherein exposing the first specimen and second specimen  
19   includes the following step:

20                 exposing the first specimen to the first magnetic field and exposing the second specimen  
21   to the second magnetic field both for a period of time within the linear portion of the time  
22   dependence curve of myosin phosphorylation rate.

23

24   33. The method of Claim 32, further including the step of:

25                 exposing the first specimen to the first magnetic field for a period within the range of  
26   time between 2 and 6 minutes, and

27                 exposing the second specimen to the second magnetic field for a period within the range  
28   of time between 2 and 6 minutes.

29

- 1    34. The method of Claim 33, further including the step of:  
2         exposing the first specimen to the first magnetic field for a period of 5 minutes; and  
3         exposing the second specimen to the second magnetic field for a period of 5 minutes.  
4
- 5    35. The method of Claim 31, wherein exposing the first specimen and exposing the second  
6         specimen both include the following step of:  
7                 stopping the reaction by adding a stopping solution to the specimen.  
8
- 9    36. The method of Claim 31, wherein exposing the first specimen and exposing the second  
10         specimen includes the following step:  
11                 stopping the reaction by eliminating the effect of the first magnetic field on the first  
12         specimen; and  
13                 stopping the reaction by eliminating the effect of the second magnetic field on the second  
14         specimen.  
15
- 16    37. The method of Claim 31, wherein the step of placing a quantity of the first volume and  
17         second volume of the solution onto a substrate includes the following step:  
18                 placing a quantity of the first volume of solution on filter paper; and  
19                 placing a quantity of the second volume of solution on filter paper.  
20
- 21    38. The method of Claim 31, wherein the step of washing the first specimen and second  
22         specimen includes the following step:  
23                 placing the first specimen in a container containing an acidic solvent; and  
24                 placing the second specimen in a container containing an acidic solvent.  
25
- 26    39. The method of Claim 38, wherein the step of placing the first and second specimen in a  
27         container containing an acidic solvent includes the following step:  
28                 placing the first specimen in a container containing a solution of TCA; and  
29                 placing the second specimen in a container containing a solution of TCA.  
30

1       40.     The method of Claim 38, wherein the step of placing the first and second specimen in a  
2 container containing an acidic solvent includes the following step:

3              placing the first specimen in a container containing an acidic solvent and agitating the  
4 solvent; and

5              placing the second specimen in a container containing an acidic solvent and agitating the  
6 solvent.

7

8       41.     The method of Claim 31, wherein the step of placing the washed first specimen and  
9 washed second specimen in a suspension liquid includes the following step:

10              placing the washed first specimen in a suspension of water; and

11              placing the washed second specimen in a suspension of water.

12

13       42.     The method of Claim 41, wherein the step of placing the washed first specimen and  
14 washed second specimen in a suspension of water:

15              placing the washed first specimen in a container of water suitable for use in a liquid  
16 scintillation counter; and

17              placing the washed second specimen in a container of water suitable for use in a liquid  
18 scintillation counter.

19

20       43.     The method of Claim 31, wherein the step of counting the number of radioactive events  
21 of either the first or second specimen over a given time T includes the following step:

22              counting the radioactive events by counting the Cherenkov emissions.

23

24       44.     The method of Claim 31, wherein exposing the reaction solution to a first or second  
25 magnetic field includes the following step:

26              creating a first or second magnetic field prior to exposure such that the first or second  
27 magnetic field has a frequency of 80 to 180 pulses per second.

28

1       45. The method of Claim 44, wherein the step of creating a first or second magnetic field  
2 prior to exposure such that the first or second magnetic field has a frequency of 80 to 180 pulses  
3 per second further includes the following step:

4              creating a first or second magnetic field having a frequency of between 80 and 140 pulses  
5 per second.

6

7       46. The method of Claim 45, wherein the step of creating a first or second magnetic field  
8 prior to exposure such that the first or second magnetic field has a frequency of 80 to 140 pulses  
9 per second further includes the following step:

10              creating a first or second magnetic field having a frequency of between 80 and 120 pulses  
11 per second.

12

13       47. The method of Claim 46, wherein the step of creating a first or second magnetic field  
14 prior to exposure such that the first or second magnetic field has a frequency of 80 to 120 pulses  
15 per second further includes the following step:

16              creating a first or second magnetic field having a frequency of between 100 and 120  
17 pulses per second.

18

19       48. The method of Claim 47, wherein the step of creating a first or second magnetic field  
20 prior to exposure such that the first or second magnetic field has a frequency of 100 to 120 pulses  
21 per second further includes the following step:

22              creating a first or second magnetic field having a frequency of 100 pulses per second.

23

24       49. The method of Claim 47, wherein the step of creating a first or second magnetic field  
25 prior to exposure such that the first or second magnetic field has a frequency of 100 to 120 pulses  
26 per second further includes the following step:

27              creating a first or second magnetic field having a frequency of 120 pulses per second.

28

1    50. The method of Claim 31, wherein exposing the reaction solution to a first or second  
2 magnetic field includes the following step:

3                 creating a first or second magnetic field prior to exposure such that the first or second  
4 magnetic field has a frequency of 100 to 120 pulses per second.

5

6    51. The method of Claim 50, wherein the step of creating a first or second magnetic field  
7 prior to exposure such that the first or second magnetic field has a frequency of 100 to 120 pulses  
8 per second further includes the following step:

9                 creating a first or second magnetic field having a frequency of 100 pulses per second.

10

11    52. The method of Claim 50, wherein the step of creating a first or second magnetic field  
12 prior to exposure such that the first or second magnetic field has a frequency of 100 to 120 pulses  
13 per second further includes the following step:

14                 creating a first or second magnetic field having a frequency of 120 pulses per second.

15

16    53. The method of Claim 31, wherein exposing the reaction solution to a first or second  
17 magnetic field includes the following step:

18                 creating a first or second magnetic field prior to exposure such that the first or second  
19 magnetic field has an amplitude between 5 and 55 milliTesla.

20

21    54. The method of Claim 53, wherein the step of creating a first or second magnetic field  
22 prior to exposure such that the first or second magnetic field has an amplitude between 5 and 55  
23 milliTesla further includes the following step of:

24                 creating a first or second magnetic field prior to exposure such that the first or second  
25 magnetic field has an amplitude between 10 and 50 milliTesla.

26

27    55. The method of Claim 54, wherein the step of creating a first or second magnetic field  
28 prior to exposure such that the first or second magnetic field has an amplitude between 10 and 50  
29 milliTesla further includes the following step of:

30                 creating a first or second magnetic field prior to exposure such that the first or second  
31 magnetic field has an amplitude between 15 and 45 milliTesla.

1

2       56. The method of Claim 54, wherein the step of creating a first or second magnetic field  
3 prior to exposure such that the first or second magnetic field has an amplitude between 10 and 50  
4 milliTesla further includes the following step of:

5              creating a first or second magnetic field prior to exposure such that the first or second  
6 magnetic field has an amplitude between 10 and 25 milliTesla.

7

8       57. The method of Claim 56, wherein the step of creating a first or second magnetic field  
9 prior to exposure such that the first or second magnetic field has an amplitude between 10 and 25  
10 milliTesla further includes the following step of:

11              creating a first or second magnetic field prior to exposure such that the first or second  
12 magnetic field has an amplitude between 15 and 20 milliTesla.

13

14       58. The method of Claim 57, wherein the step of creating a first or second magnetic field  
15 prior to exposure such that the first or second magnetic field has an amplitude between 10 and 20  
16 milliTesla further includes the following step of:

17              creating a first or second magnetic field prior to exposure such that the first or second  
18 magnetic field has an amplitude of 15 milliTesla.

19

20       59. The method of Claim 54, wherein the step of creating a first or second magnetic field  
21 prior to exposure such that the first or second magnetic field has an amplitude between 10 and 50  
22 milliTesla further includes the following step of:

23              creating a first or second magnetic field prior to exposure such that the first or second  
24 magnetic field has an amplitude between 40 and 50 milliTesla.

25

26       60. The method of Claim 59, wherein the step of creating a first or second magnetic field  
27 prior to exposure such that the first or second magnetic field has an amplitude between 40 and 50  
28 milliTesla further includes the following step of:

29              creating a first or second magnetic field prior to exposure such that the first or second  
30 magnetic field has an amplitude of 45 milliTesla.

31

1       61. The method of claim 31 wherein the step of counting a number of radioactive events  
2       associated with the first specimen over a time T, and the step of counting a number of radioactive  
3       events associated with the second specimen over a time T further includes the step of:

4                 comparing the number of radioactive events associated with the first specimen to the  
5       number of radioactive events associated with the second specimen.

6

7       62. An apparatus for generating a magnetic field found to coincide with a biological window  
8       of magnetic field metrics, comprising:

9                 a coil assembly including at least one electrical conductor; and

10                a source of electric current applied to the length of electrical conductor to create a  
11       magnetic field having an amplitude within a known biological magnetic field metric window  
12       within the interior of the coil.

13

14       63. The apparatus of Claim 62, further comprising:

15                a frame defining a coil assembly interior when the coil is wrapped about the frame.

16

17       64. The apparatus of Claim 63, further comprising:

18                a central passageway extending through the frame.; and

19                a useful magnetic field frequency in pulses per second which is double the frequency of  
20       the input current obtained from a readily available commercial electric power supply.

21

22       65. The apparatus of Claim 64, further comprising:

23                a rectifier for doubling the frequency of the input electric current.

24

25       66. The apparatus of Claim 62, wherein:

26                the coil assembly is configured to create a magnetic field having a frequency of 80 to 180  
27       pulses per second.

28

29       67. The apparatus of Claim 66, wherein:

30                the coil assembly is configured to create a magnetic field having a frequency of 80 to 140  
31       pulses per second.

- 1       68.     The apparatus of Claim 67, wherein:  
2              the coil assembly is configured to create a magnetic field having a frequency of 80 to 120  
3        pulses per second.  
4  
5        69.     The apparatus of Claim 68, wherein:  
6              the coil assembly is configured to create a magnetic field having a frequency of 100 to  
7        120 pulses per second.  
8  
9        70.     The apparatus of Claim 69, wherein:  
10             the coil assembly is configured to create a magnetic field having a frequency of 100  
11        pulses per second.  
12  
13       71.     The apparatus of Claim 69, wherein:  
14             the coil assembly is configured to create a magnetic field having a frequency of 120  
15        pulses per second.  
16  
17       72.     The apparatus of Claim 62, wherein:  
18             the coil assembly is configured to create a magnetic field having a frequency of 100 to  
19        120 pulses per second.  
20  
21       73.     The apparatus of Claim 72, wherein:  
22             the coil assembly is configured to create a magnetic field having a frequency of 100  
23        pulses per second.  
24  
25       74.     The apparatus of Claim 72, wherein:  
26             the coil assembly is configured to create a magnetic field having a frequency of 120  
27        pulses per second.  
28  
29       75.     The apparatus of Claim 62, wherein:  
30             the coil assembly is configured to create a magnetic field having an amplitude between 5  
31        and 55 milliTesla.

- 1      76.    The apparatus of Claim 75, wherein:  
2                 the coil assembly is configured to create a magnetic field having an amplitude between  
3        10 and 50 milliTesla.  
4  
5      77.    The apparatus of Claim 76, wherein:  
6                 the coil assembly is configured to create a magnetic field having an amplitude between  
7        15 and 45 milliTesla.  
8  
9      78.    The apparatus of Claim 77, wherein:  
10                the coil assembly is configured to create a magnetic field having an amplitude between  
11       10 and 25 milliTesla.  
12  
13     79.    The apparatus of Claim 78, wherein:  
14                the coil assembly is configured to create a magnetic field having an amplitude between  
15       15 and 20 milliTesla.  
16  
17     80.    The apparatus of Claim 79, wherein:  
18                the coil assembly is configured to create a magnetic field having an amplitude of 15  
19       milliTesla.  
20  
21     81.    The apparatus of Claim 75, wherein:  
22                the coil assembly is configured to create a magnetic field having an amplitude between  
23       40 and 50 milliTesla.  
24  
25     82.    The apparatus of Claim 81, wherein:  
26                the coil assembly is configured to create a magnetic field having an amplitude of 45  
27       milliTesla.